SUPPORT FOR THE AMENDMENTS

Applicants have amended Claims 1 and 14, to incorporate the limitations of Claims 8 and 23, respectively. Accordingly, support for amended Claims 1 and 14 can be found in Claims 1, 8, 14, and 23, as originally filed. Applicants have also added new Claims 40 and 41. Support for these claims can be found in Claims 30 and 32, as originally filed.

No new matter has been added. Claims 1-7, 9-22, and 24-41 are pending in this application.

REMARKS/ARGUMENTS

Present Claims 1-7 and 8-13 relate to methods of concentrating a material comprising at least a first component and a second component, to form a product having an increased concentration of one of said first and second components, said method comprising:

(a) removing salts from said material;

(b) cooling at least a portion of said material to a temperature at or below the melting point of said material, said portion containing said first component in liquid phase;

(c) applying ultrasonic energy to at least said cooled portion of said material to form a solid phase comprising said first component; and

(d) collecting said solid phase.

Present Claims 14-22, 24, and 25 relate to systems for concentrating a material comprising at least a first component and a second component, to form a product having an increased concentration of one of said first and second components, said system comprising:

(a) a heat transfer device for cooling at least a portion of said material to a temperature at or below the melting point of said material, said portion containing said first component in liquid phase;

(b) an ultrasonic energy source for applying ultrasonic energy to at least the cooled portion of said material to form a solid phase comprising said first component;

(c) a dialysis material for removing salts from said material; and

(d) means for collecting said solid phase.

Thus, the presently claimed methods involve the use of salt removal from a material in conjunction with cooling at least a portion of the material; subjecting at least the cooled portion of the material to ultrasonic energy to form a solid phase; and collecting the solid phase. The inventor has discovered that the presently claimed methods and systems are particularly effective for concentrating materials which contain a first component and a second component. More particularly, by removing salts, it is possible to effectively concentrate materials while avoiding the problem of salting out proteins which is often encountered with increasing salt concentrations. Moreover, in the case of blood plasma and blood plasma concentrates, salt removal may be important to obtain a non-toxic product for use in direct transfusions.

The cited references contain no disclosure or suggestion of the presently claimed methods or systems. Moreover, these references contain no suggestion of the improvements afforded by the presently claimed methods or systems. Accordingly, these references cannot affect the patentability of the present claims.

The rejection of Claims 1, 5, 7, 14, 15, 17, 18, and 22 under 35 U.S.C. §102(b) in view of U.S. Patent No. 5,435,155 (Paradis); the rejection of Claims 1, 10-15, 17, 18, and 24-25 under 35 U.S.C. §102(e) in view of U.S. Patent No. 5,966,966 (Botsaris et al); the rejection of Claims 1-4, 7, 14-19, and 22 under 35 U.S.C. §103(a) in view of WO 92/20420 in view of Paradis; and the rejection of Claims 6, 20, and 21 under 35 U.S.C. §102(b) in view of WO 92/20420 in view of Paradis and further in view of U.S. Patent No. 4,479,989 (Mahal) have all been obviated by appropriate amendment. As the Examiner will note, Applicant has

amended Claims 1 and 14 to incorporate the limitations of Claims 8 and 23, respectively. Applicant submits that Claims 1 and 14, as well as the claims dependent thereon, are patentable over these cited references for the same reasons that Claims 8 and 23 were not rejected in view of these references. For these reasons, these rejections should be withdrawn.

The rejection of Claims 8, 9, and 23 under 35 U.S.C. §103(a) in view of Paradis in further view of U.S. Patent No. 4,156,645 (Bray) is respectfully traversed. Paradis discloses a high-efficiency liquid chiller. This reference also discloses that freeze concentrations are divided into two types of categories (see col. 21, line 62, to col. 22, line 12). In the first category disclosed by Paradis, the desired product is the solvent and the degree of concentration is low because the concentrate is easily disposed of. This category includes desalination, of which Paradis discloses: "Water desalination is an example: the concentrate (e.g., 50% or more of the original solution) is discharged back into the sea."

The second category of freeze concentration disclosed by Paradis includes those in which the desired product is the concentrate, i.e., a relatively high concentration is needed and the desired product is the concentrate. Examples of this category include the concentration of acids, alkali, milk, salts, coffee extract, etc. As stated by Paradis:

> Being formed without any physical constraint, the ice crystals formed from a supercooled aqueous liquid flow are absolutely pure solid water. Supercooling can thus become the basic process in a new freeze concentration method. An example is that of obtaining potable water from polluted water. When separated from the original solution, washed clean and melted, the crystals become pure water.

Paradis, col. 22, lines 5-12.

Paradis then goes on to describe various methods of enhancing the "separation process" in the very next paragraph (see, col. 22, lines 13-27). Thus, at most, this reference discloses that freeze concentration can be used for water desalination. In other words, this reference discloses that salt water may be desalinated by (1) cooling salt water to afford pure

water crystals and a liquid which is enriched in salts; (2) separating the pure water crystals from the liquid; and (3) then melting the pure water crystals to obtain purified water.

Thus, the freeze concentration/desalination disclosed in Paradis is quite distinct from the method of present Claim 1. Specifically, in the desalination method of Paradis, the only solid phase formed consists of the pure water crystals. Thus, the pure water crystals in the desalination method of Paradis correspond to the "solid phase" of present Claim 1, and the separation of the saline concentrate from the pure water crystals in the desalination method of Paradis corresponds to the "collecting said solid phase" of present Claim 1.

However, as explained above, present Claim 1 recites the use of salt removal in conjunction with cooling, applying ultrasonic energy, and collecting the resulting solid phase. Thus, there is nothing in Paradis which corresponds to the salt removal step recited in Claim 1.

Applicant submits that there is no disclosure in Bray which can cure the basic deficiency of Paradis. Specifically, Bray only discloses the use of reverse osmosis for desalination of sea water. There is no disclosure in this reference of using salt removal in conjunction with a method of cooling a material and applying ultrasonic energy to the cooled material to obtain a solid phase.

Further, one of skill in the art would not be motivated to combine the teachings of the two cited references. As noted in Paradis, the degree of concentration in desalination is low, because the concentrate is easily disposed of by discharge into the sea. Thus, there is no need for any further concentration, and one of skill in the art would not be motivated to combine the reverse osmosis of Bray with the freeze concentration of Paradis.
Moreover, there is nothing in this reference which would suggest any improvement to be obtained by the presently claimed method. However, as explained above, by removing salts, it is possible to effectively concentrate materials while avoiding the problem of salting out

proteins, a problem which is often encountered with increasing salt concentrations. Furthermore, in the case of blood plasma and blood plasma concentrates (see Claim 40), salt removal may be important to obtain a non-toxic product for use in direct transfusions.

Accordingly, the rejection should be withdrawn.

The objection to Claim 1 has been obviated by appropriate amendment. As the Examiner will note, Applicant has amended Claim 1 such that it is free of the criticism outlined in paragraph no. 7 of the Office Action.

The rejection of Claims 6 and 7 under 35 U.S.C. §112, second paragraph, has also been obviated by appropriate amendment. As the Examiner will note, the claims have been amended such that they are free of the criticisms outlined in paragraph no. 9 of the Office Action. Again, the rejection should be withdrawn.

The requirement for submission of an Abstract is noted. However, Applicant notes that the present application already contains an appropriate Abstract at page 62.

The objection to the disclosure on the ground that it does not contain a brief description of the drawings is also noted. However, Applicant notes that a section entitled "Brief Description of the Drawings" is given at page 13, lines 10-23.

Applicant also acknowledges the requirement for proposed corrected drawings and is complying by filing proposed corrected drawings herewith.

Applicant submits that the present application is now in condition for allowance, and early notification of such action is earnestly solicited.

Respectfully submitted,

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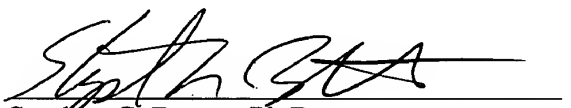

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